Ordering number : EN5660

Monolithic Linear IC

LA4168M

Record/Playback System for Microcassette and Compact Cassette Recorders

Overview

The LA4168M is a record/playback system IC for microcassette and compact cassette recorders. The LA4168M is an extremely high-functionality IC that includes a motor control governor circuit, a voice sensor circuit that detects sounds and turns motor on or off, a power switch control circuit that receives an electrical signal from a photosensor and turns all of the IC function blocks on or off, and a circuit that increases the speed of the motor during playback.

Functions

- Microphone and playback preamplifiers
- Record amplifier
- Power amplifier (BTL, 4 Ω)
- Automatic stop circuit (power switch)
- Governor circuit
- Motor speed and high-speed switching circuit
- Microphone power supply
- LED drive circuit
- Voice sensor circuit

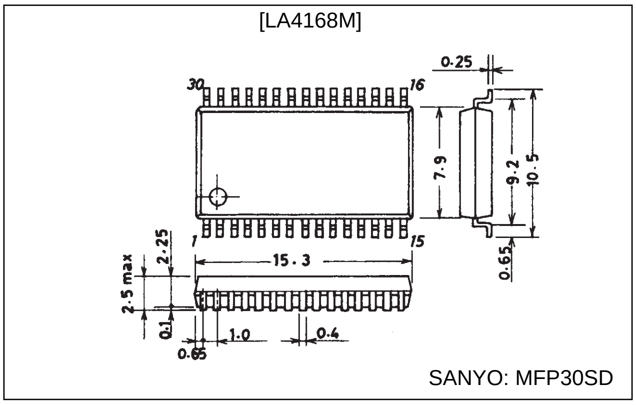
Features

- Includes a voice switch that can turn the governor on or off.
- Includes a power switch circuit that can turn all the IC function blocks on or off from a photosensor signal. During record, the IC can automatically turn the governor on or off according to the microphone input level, and furthermore, the governor on/off level can be continuously adjusted from an external control knob. (The control used for volume adjustment during playback.)
- Continuously variable microphone monitor level.
- Includes a drive pin for an LED that lights only when the governor is on in record mode.

Package Dimensions

unit: mm

3073A-MFP30SD



Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		4.5	V
Allowable power dissipation	Pd max		800	mW
Operating temperature	Topr		–10 to +50	°C
Storage temperature	Tstg		–55 to +150	°C

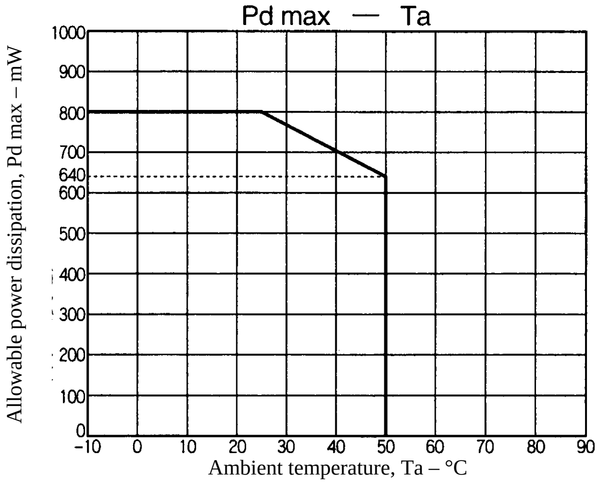
Operating Conditions at Ta = 25°C

Parameter		Symbol	Conditions	Ratings	Unit
Recommended supply voltage		V_{CC}		3.0	V
Operating voltage range		V_{CC}op		1.8 to 3.6	V
Load resistance	(power block)	$R_L$pwr		4	Ω
	(preamplifier block)	$R_L$pre		10	kΩ

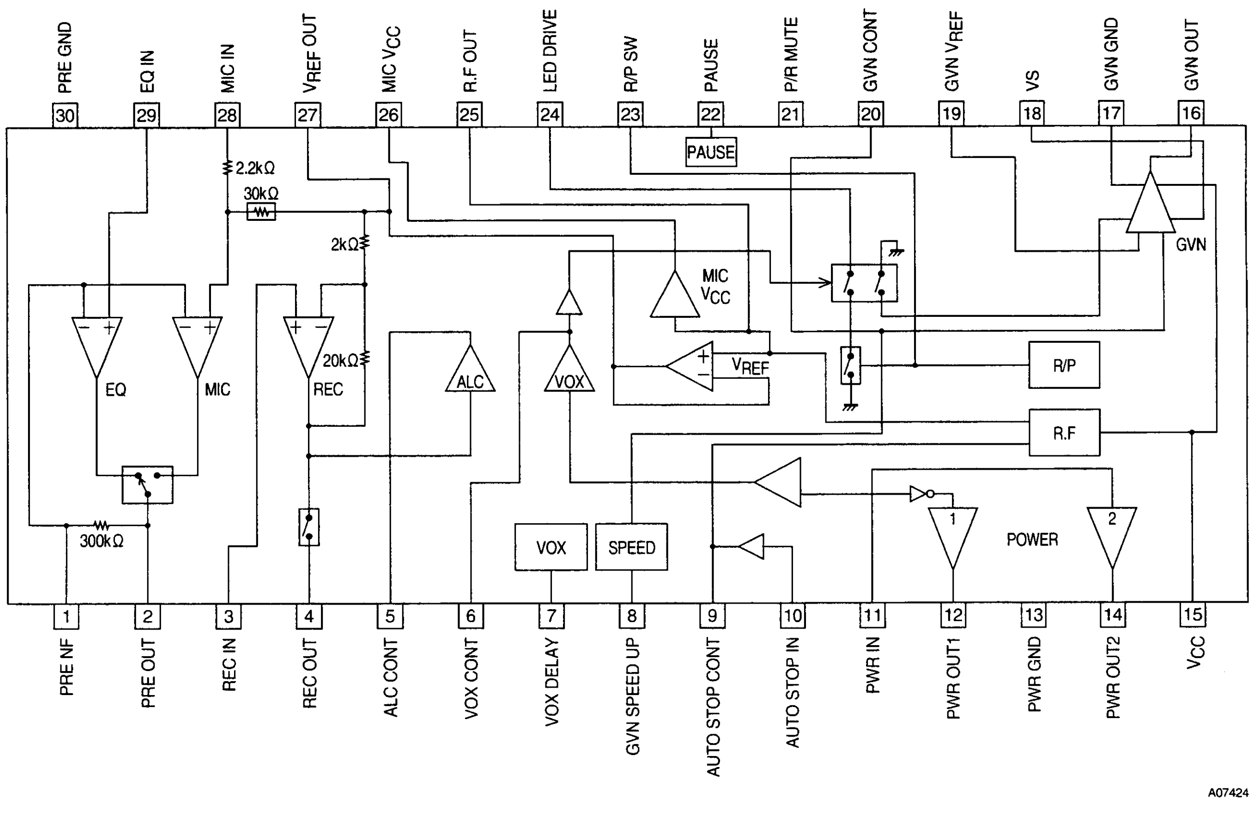
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Operating Characteristics at Ta = 25°C, V_{CC} = 3.0 V, R_L = 4 Ω (power amplifier), R_L = 10 kΩ (preamplifier), f = 1 kHz, 0 dBm = 0.775 V

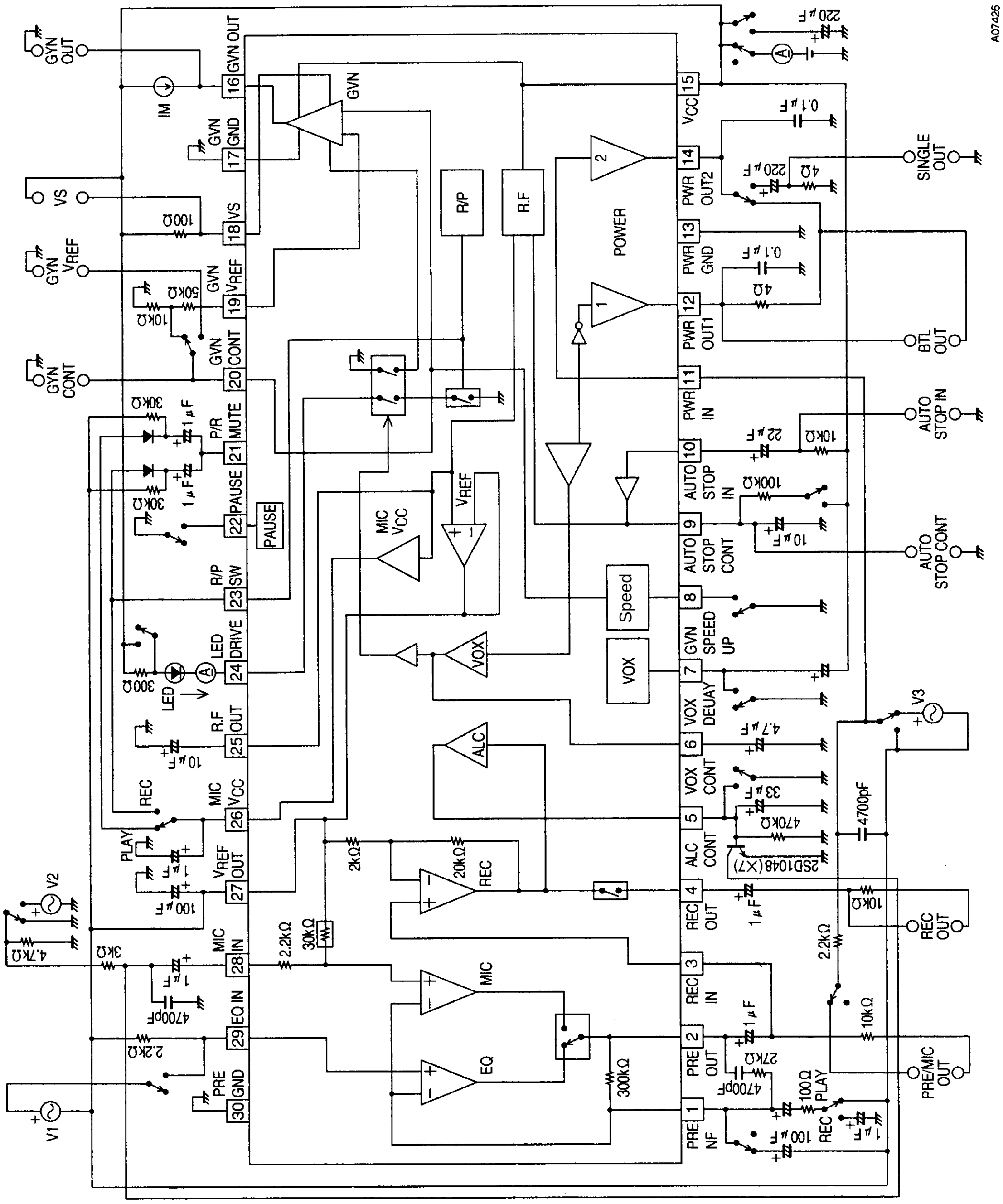
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[PRE + POWER + GVN]						
Standby current	I_{STB}	With pin 9 connected to V_{CC} through a 100-kΩ resistor	25	170	250	µA
[PRE + POWER]						
Quiescent current	I_{CC-R}	REC MODE, Vi = 0 V	6	12	18	mA
	I_{CC-P}	PLAY MODE, Vi = 0 V, VOL MIN	12	18	25	mA
Voltage gain	VG_{TP}	PLAY MODE, V_O = –5 dBm	71.5	74	76.5	dB
[EQ AMP]						
Voltage gain (open loop)	VG_{OP}	C_{NF} = 100 µF	80	85		dB
Voltage gain (closed loop)	VG_P		50	52	54	dB
Maximum output voltage	V_{OP} max	THD = 1 %	0.5	0.75		V
Total harmonic distortion	THD_P	V_O = 0.3 V		0.2	0.6	%
Equivalent input noise voltage	V_{NIP}	Rg = 2.2 kΩ, DIN audio		1.0	2.0	µV
Ripple rejection ratio	R_{rp}	Rg = 2.2 kΩ, f_R = 1 kHz filter	45	60		dB
[MIC AMP] VOL MIN, ALC OFF						
Voltage gain (closed loop)	VG_M1	ALC OFF	43	45	47	dB
Maximum output voltage	V_{OmaxM}	THD = 1 %, R_L = 10 kΩ	0.5	0.75		V
Total harmonic distortion	THD_M	V_O = 0.3 V		0.6	1.0	%
Equivalent input noise voltage	V_{NIM}	Rg = 3 kΩ, DIN audio		2.0	4.0	µV
Ripple rejection ratio	SVRR	Rg = 3 kΩ, f_R = 1 kHz filter	40	53		dB
Input resistance	R_{IM}		24	32	40	kΩ
[MIC + REC] VOL MIN						
Voltage gain (closed loop)	VG_{RT}	ALC OFF	63.5	65.5	67.5	dB
Maximum output voltage	V_{OmaxR}	THD = 5 %	0.6	1.0		V
Output noise voltage	V_{NORT}	MIC Input, Rg = 3 kΩ, DIN audio		3.5	8.0	mV
Ripple rejection ratio	R_{rRT}	Rg = 3 kΩ, f_R = 1 kHz , 1 kHz filter	20	32		dB
[POWER AMP]						
Voltage gain (closed loop)	VG_{BTL}	BTL ON, V_O = –10 dBm	21.5	24	26.5	dB
Voltage gain (closed loop)	VG_{SIN}	Single, V_O = –10 dBm	20.5	23	25.5	dB
Output power	P_{OBTL}	THD = 10 %, BTL ON	200	350		mW
	P_{OSIN}	THD = 10 %, Single	50	120		mW
Total harmonic distortion	THD_{BTL}	BTL ON, V_O = 0.25 V	0.1	0.8	2	%
Output noise voltage	V_{NOBTL}	BTL ON, Rg = 0 kΩ		20	50	µV
Ripple rejection ratio	R_{rBTL}	BTL ON, Rg = 0 kΩ, f_R = 1 kHz , 1 kHz filter	50	70		dB
Output DC offset	V_{DCOFF}	BTL ON, Rg = 0 kΩ	0	10	50	mV
Input resistance	R_{INBTL}		21	30	39	kΩ
[ALC]						
ALC width	ALC_W	The input level width from the point the ALC circuit operates to the point the harmonic distortion reaches 5%	40	67		dB
ALC harmonic distortion	ALC_{THD}	Vim = –40 dBm		1.0	2.0	%
ALC output	ALC V_O	Vim = –40 dBm	0.33	0.43	0.53	V
ALC start input	ALC V_{IN}	Vim = –40 dBm	–79	–74	–69	dBm
[Voice Sensor (VOX)]						
Operation start input voltage	$V_{OP\ min}$	VOLUME (10 kΩ) max	–90	–85	–80	dBm
Input hysteresis	$V_{O\ HL}$		3	6	9	dB
[Auto-Stop]						
Operation voltage	$V_{I\ ATS}$	The pin 9 voltage at the point the auto-stop circuit operates	0.65	0.7		V
[LED]						
LED drive current	I_{LED}	The input current when shorted through a 300-Ω resistor	8	15	22	mA
[GVN]						
Reference voltage	Vref	Im = 100 mA	1.1	1.25	1.4	V
Current division ratio	K	Im = 50 – 100 mA	45	50	55	
Residual voltage	Vsat	V_{REF} = CONT, Im = 200mA	0.1	0.2	0.5	V
The CONT pin voltage in speed up mode	Vcont		0.35	0.41	0.47	V
Reference voltage/voltage characteristics	$\frac{\Delta Vref}{Vref}/\Delta V_{CC}$	V_{CC} = 1.8 to 4.5 V, Im = 100 mA	0	0.2	0.6	%/V
Current division ratio/voltage characteristics	$\frac{\Delta K}{K}/\Delta V_{CC}$	V_{CC} = 2.0 to 4.5 V, Im = 50 – 100 mA	0	0.3	0.7	%/V
Reference voltage/current characteristics	$\frac{\Delta Vref}{Vref}/\Delta Im$	Im = 50 – 200 mA	0	0.002	0.03	%/mA
Current division ratio/current characteristics	$\frac{\Delta K}{Vref}/\Delta Im$	Im = 50 – 100 mA to 150 – 200 mA	–0.07	0.03	+0.07	%/mA



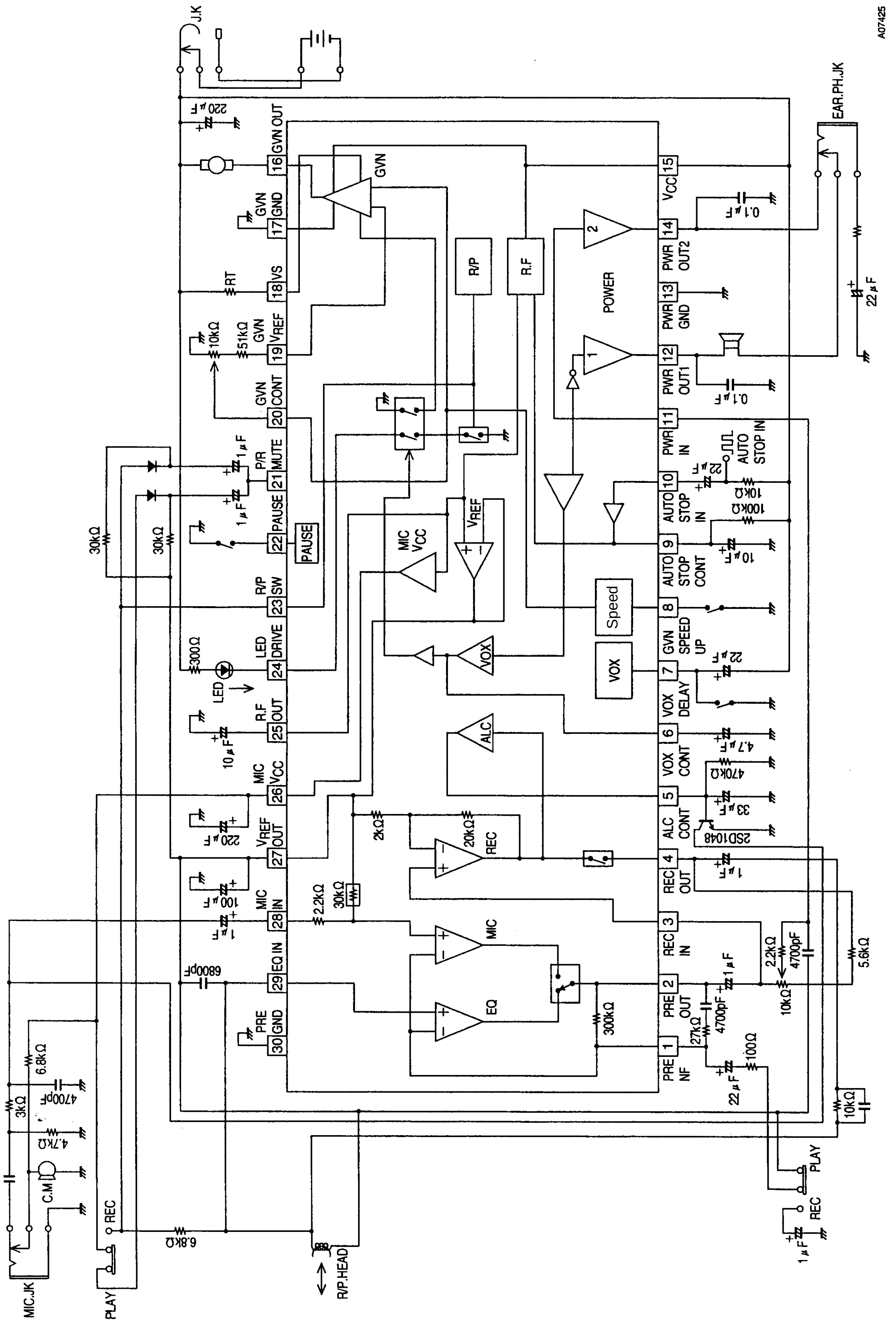
Block Diagram



Test Circuit Diagram



Sample Application Circuit



For the record/playback switch described above, during playback the power supply ripple may be output from the REC OUT pin (pin 4) and influence the EQIN pin (pin 29). This problem can be minimized by adding a 5.6-kΩ resistor between pin 4 and pin 27.

This catalog provides information as of July, 1997. Specifications and information herein are subject to change without notice.